CS 151: ARTIFICIAL INTELLIGENCE

Professor America Chambers

Getting to know you

- □ Name
- □ Major
- □ Interesting fact about yourself

Course Topics

- Part I: Problem solving
  - Search
  - Adversarial Games
  - Constraint satisfaction
- Part II: Reasoning with uncertainty
  - Probability
  - Bayesian networks
  - Reasoning over time (hidden Markov models)
- Part III: Learning
  - Supervised learning
  - Clustering

Course Syllabus

http://www.cs.pomona.edu/classes/cs151/

Today

- Reading
  - *Skim* Artificial Intelligence: A Modern Approach (AIMA) Chapter 1

- Objectives
  - Introduction to Artificial Intelligence (AI)
    - How do we define AI?
    - Subfields of AI
    - A short history of AI

Most people's conception of AI

The AI Landscape

A definition of "AI"

□ "AI is our attempt to create a 'machine' that thinks (or acts) humanly (or rationally)"

| Think like a human Cognitive Modeling	Think rationally Logic-based Systems
Act like a human Turing Test	Act rationally Rational Agents

Subfields of AI:
Natural Language Processing (NLP)

- Understanding
  - Speech recognition
  - Entity and co-reference resolution
- Generation
  - Automatic summarization
  - Natural language generation
  - Speech and gesture generation
- Other
  - Machine translation
  - Question answering
 - Sentiment analysis

Subfields of AI:
Knowledge representation and common sense

- What would happen if I dropped my computer on the ground? How do you think I would react?

- How do you get common sense into a computer?
- Opencyc.org
- OpenMindCommonSense (OMCS)
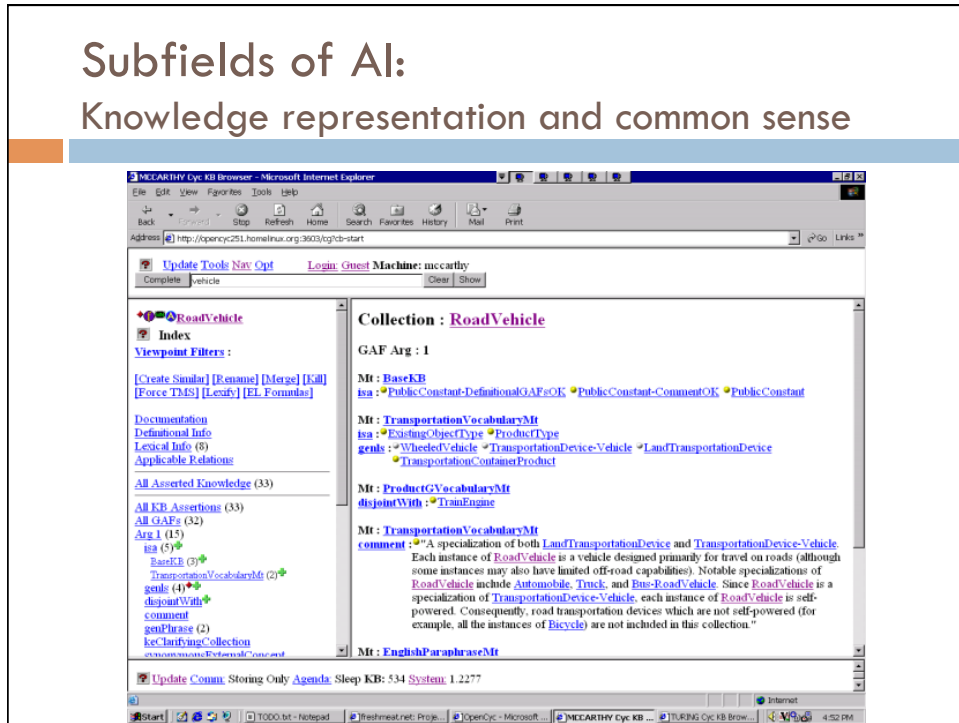
Subfields of AI:
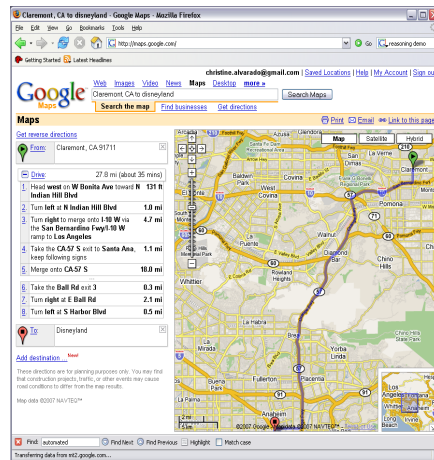## Knowledge representation and common sense

Subfields of AI:
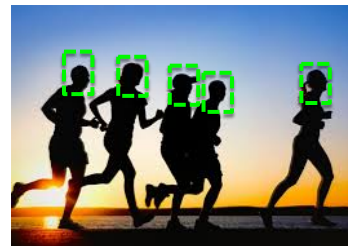## Knowledge representation and common sense

http://www.cyc.com/cycdoc/vocab/upperont-diagram.html
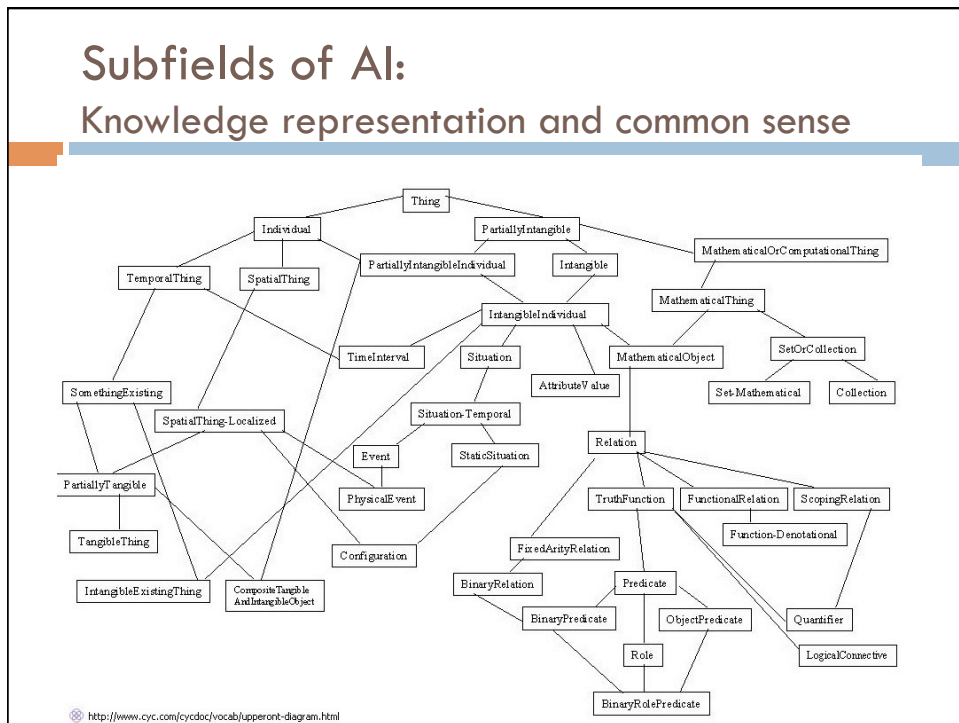
Subfields of AI:
Automated Reasoning and Planning

- ☐ Game playing
- ☐ Planning
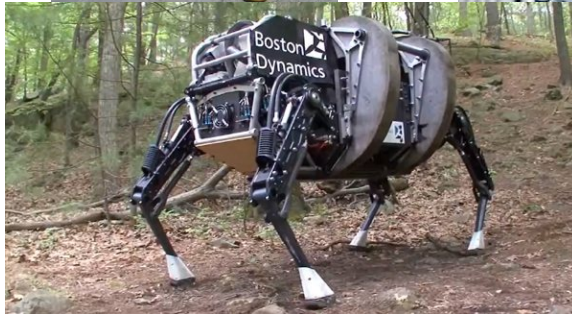- ☐ Route finding

Subfields of AI:
Perception (vision, graphics)

- ☐ Image classification
  - ☐ Does the image contain an instance of X?
  - ☐ Where is the person's head? What is the person doing?

- ☐ Scene segmentation
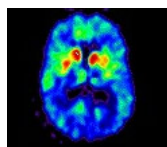- ☐ Object and face recognition

Subfields of AI:
Robotics

Subfields of AI:
Machine Learning

- A better name would be "Pattern Recognition"
  - Supervised learning – labeled data
  - Unsupervised learning – unlabeled data
  - Reinforcement learning – learning with rewards
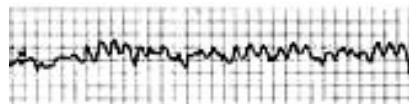

How much land was burned?

Patient have Parkinsons?

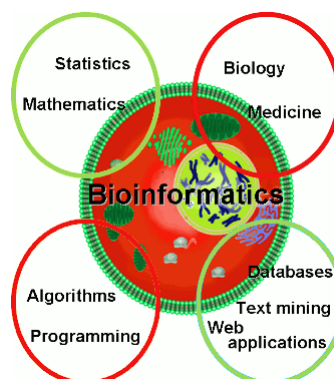Learn a model of western music?

Is this person having a heart attack?

Applications of AI: Bioinformatics

- Sequence alignment
- Gene finding
- Genome assembly
- Drug design and discovery
- Protein structure prediction

A (short) history of AI

- 1940-1950: Early days
  - 1943: McCullogh&Pitts, boolean circuit of brain
  - 1950: Turing's "Computing machinery and intelligence"

- 1950-1970: "Look, Ma, no hands!"
  - 1950s: Early AI programs including Samuel's checkers program, Newell & Simon's Logic theorist, Gelernter's Geometry Engine
  - 1956: Dartmouth meeting, "Artificial Intelligence" adopted
  - 1965: Robinson's complete algorithm for logical reasoning

- 1970-1990: Knowledge-based approaches
  - 1969-79: Early development of knowledge-based systems
  - 1980-88: Expert systems industry booms
  - 1988-93: Expert systems industry busts, "AI winter"

- 1990: Statistical approaches
  - Resurgence of probability, focus on uncertainty
  - General increase in technical depth
  - Agents and learning systems…"AI spring?"

Taken from Berkeley CS188 slides

Reminders

- The reading is important!
  - Skim Chapter 1
- Course information
  - Read through the syllabus and Academic Honesty Policy
  - Make sure you have a DCI account
  - Make sure you accept the Piazza invitation
- HW1 is due by midnight Friday